

Gluon Shadowing and Hadron Production at RHIC *

Shi-yuan Li and Xin-Nian Wang

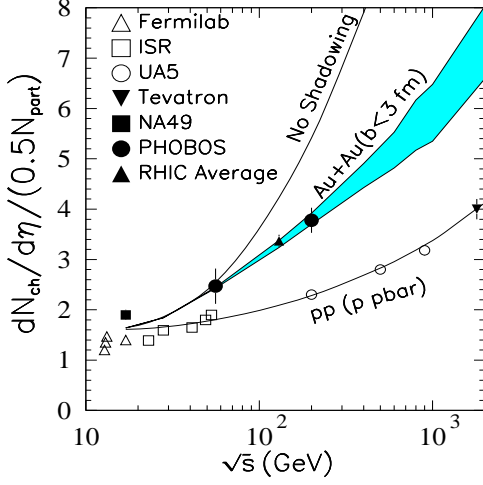


Figure 1: Charged particle rapidity density *per participating nucleon pair* versus the c.m. energy. The RHIC data (filled circle and up-triangle) for the 6% most central Au+Au are compared to pp and $p\bar{p}$ data (open symbols) and the NA49 $Pb + Pb$ (central 5%) data (filled square). The two-component mini-jet model with and without shadowing is also shown. The shaded area for central $Au + Au$ collisions corresponds to the range of gluon shadowing parameter.

We have studied the energy and centrality dependence of the central rapidity density of hadron multiplicity in heavy-ion collisions at RHIC energies within a two-component mini-jet model. As a consequence of the latest parameterization of parton distributions which have a higher gluon density than the old parameterization used in previous studies, the cut-off scale that separates soft and hard processes is found to increase slightly with energy in order to fit the $p + p(\bar{p})$ data. The cut-off scale, however, is still large enough that the independent jet production picture is still valid. With a new parameterization of nuclear shadowing of parton distributions in nuclei, we also found that RHIC data require a strong shadowing of gluon distribution.

Using this strong gluon shadowing with an assumed impact-parameter dependence, the predicted centrality dependence of the hadron multiplicity

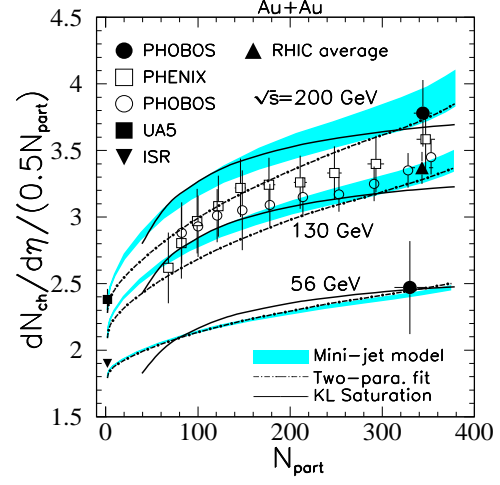


Figure 2: The charged hadron central rapidity density per participant nucleon pair as a function of the averaged number of participants from the two-component model (shaded lines), two-parameter fit (dot-dashed lines) and parton saturation model as compared to experimental data.

agrees well with the recent RHIC results. We have also compared our results with the parton saturation model [?, ?]. We point out that in order to differentiate the two models one needs more accurate experimental data in both the most central and peripheral regions of centrality or study the centrality dependence of the ratios at different colliding energies.

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